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AUTHOR Abbott, Robert D.; Churchill, Lynn D.
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ABSTRACT

This report reviews the 1984-86 projects of the University of Washington Center for Instructional Development and Research (CIDR), a central facility designed to assist instructors, teaching assistants, and departments in the continued improvement of learning and teaching. Following an overview of CIDR's funding, facilities, and staff resources, projects undertaken in response to four catagories of requests are briefly described: (1) faculty instructional development, including workshops and seminars, instructional videotape development, and software evaluation; (2) individual project consultations with faculty in the departments of architecture, arts and sciences, business administration, education, engineering, health sciences, library and information science, pharmacy, and social work; (3) use of networking and telecommunications, including support for satellite teleconferences, instructional configuration of a local area network, and software training for hearing-impaired students; and (4) using advanced educational workstations, including development of videodiscs. A list of 32 CIDR publications and presentations is appended. (MES)

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Instructional Uses of Microcomputers
Summary of 1982-1983 Projects
Center for Instructional Development and Research

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The materials in the Special Collection on the Training of Teaching Assistants were developed through the active efforts of numerous educators who first met at the 1986 National Conference on the Institutional Responsibilities and Responses in the Employment and Education of Teaching Assistants held at the Ohio State University. Assisted by more than 80 individuals, the committee chairs listed below were able to establish the collection which will be developed and maintained by the ERIC Clearinghouse for Higher Education. This arrangement will enable faculty members, faculty developers, administrators, TA supervisors, and graduate teaching assistants to have access to TA training materials produced by institutions across the nation.

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Instructional Uses of Microcomputers
Summary of 1984-1986 Projects
Center for Instructional Development and Research

Robert D. Abbott, Director for Program Research
Lynn D. Churchill, CAI Research and Development Coordinator

Center for Instructional Development and Research
107 Parrington Hall, DC-07
University of Washington
Seattle, Washington 98115
(206) 543-6588

Instructional Uses of Microcomputers
Summary of 1984-1986 Projects
Center for Instructional Development and Research

Representing a part of the University of Washington's commitment to excellence in teaching, the Center for Instructional Development and Research (CIDR) provides a central facility to assist instructors, teaching assistants, and departments in the continued improvement of learning and teaching. The Center functions as a resource clearinghouse for instructional problems providing consultation and access to educational materials, equipment, and services. Center personnel act as catalysts to stimulate departments to undertake instructional improvement efforts. Center staff work together providing services, conducting research projects on learning and teaching, and publishing materials on instructional improvement in order to assist departments in their efforts. CIDR's responsibilities include responding to the needs of instructors incorporating computers into their instruction.

Categories of Faculty Requests

Since August 1983, when CIDR assumed its current organizational structure, we have received numerous requests from faculty for assistance in the application of computer-related technology for instructional purposes. These requests are diverse but can be categorized into *four* types.

First, as faculty become more aware of advances in computer-related technology, they are more concerned with how they might effectively integrate these advances into their teaching of undergraduate and graduate students. Consequently, they request assistance and training in the instructional uses of software, computer-related hardware, local area networks, and telecommunications technology. These requests might be categorized as requests to CIDR for general **faculty instructional development** in the introduction of computer-related technologies into instruction.

Second, when they begin to implement computers into their teaching, faculty request **individual project consultation** on instructional techniques, student activities and support materials, and modification of their curriculum's scope and sequence. For example, as faculty become more aware of the benefits of using computer based tutorials for teaching facts and rote knowledge, they request assistance from CIDR in the development of computer-assisted tutorial lessons and systems of computer-managed diagnosis, placement, and record-keeping. Many faculty believe that the instruction of such concepts and their elementary application should occur in these computer-managed instructional environments. The faculty member can then use lecture and class discussion to focus more on teaching integration, synthesis, and problem solving within the discipline. In another example, faculty have asked for CIDR's assistance in helping them to incorporate real-time computer simulations into their lectures.

Third, faculty request CIDR assistance with using **networks and telecommunications in teaching.** For example, faculty request CIDR to assist them in the processes of accessing a database of information or numerical data stored on another computer system, sending an extract of that database to a microcomputer, and using that information in teaching their undergraduate classes.

Fourth, faculty request that CIDR assist them in **using advanced educational workstations** incorporating computer-related technologies such as interactive videodisc, artificial intelligence and expert systems software, CD ROM disks, and touch and voice computer interfaces.

Funding, Facilities, and Staff Resources

These requests are numerous and diverse and require significant staff consultation, equipment and software access, and resources for development. Unfortunately, CIDR's 1984-1987 carry-forward state budgets did not include funding for these activities. We have, therefore, applied for research grants and participated as one cluster in the IBM OLYMPUS project in order to acquire equipment, software, and staff to respond to faculty requests for assistance in incorporating computers into their instruction. Descriptions of the amounts, sources, and objectives of the donations, grants and contracts we have received are listed in Appendix A.

Given the faculty requests described earlier, we felt that our first task was to establish a well-equipped microcomputer laboratory available to instructors across campus for development and evaluation of computer-based instructional materials. Using the support identified in Appendix A from donations, external grants and the OLYMPUS project during 1984-1986, CIDR developed a microcomputer instructional laboratory of 15 student stations and 2 teacher stations linked in a local area network using IBM's PC Network hardware and software. Each station is equipped with Level III interactive videodisc and graphics-input capabilities. This local area network is linked to the University of Washington computer network and BITNET. We configured our workstations and laboratory in this way to permit the diverse set of applications requested by faculty. Consequently, our configuration has allowed the laboratory to be used for a wide variety of workshops for faculty as well as by classes of students participating in courses being developed and evaluated by faculty.

Because of restricted space availability, CIDR was initially allocated Parrington 210 to house the microcomputer laboratory and staff offices from July, 1984 to March, 1986. We reallocated space in Parrington 105 away from other CIDR projects to provide desks for 4 staff persons working on OLYMPUS projects. Minimal remodeling of Parrington 105 and 210 was supported by a $10,000 grant from the University of Washington Classroom Improvements Committee. Since March, 1986, we have been able to use temporarily six other offices on the second floor of Parrington Hall. Permanent office and microcomputer laboratory space on the first floor of Parrington will be assigned to CIDR during the current rennovation process of the building.

In order to respond to faculty needs for general faculty development and to provide curricular and instructional design assistance on individual projects, CIDR hired a Coordinator for CAI Research and Development. With funds from the OLYMPUS project, we have supported our coordinator for 50% time from September 1984 to June 1985, 100% time July 1985 to August, 1985, and 50% time September 1985 to July 1987. His other time has been supported by research grants enabling him to begin responding to faculty requests for help incorporating advanced educational workstations into their instruction. He has assisted these faculty in identifying the relevant curricular and instructional issues and in developing grant proposals to support their instructional development. He also has responsibility for designing and making operational our microcomputer instructional laboratory as well as representing CIDR on the OLYMPUS technical committee.

In order to provide the necessary hardware and software support for faculty using our networked microcomputer laboratory, CIDR employed a System Analyst. Funding to support him has come in part from our OLYMPUS project state funding and in part from grants. We were able to find grant support which permitted us to configure and "tune" the laboratory for instructional uses as well as connect the local area network to national computer networks. This allows us to respond to faculty requests for assistance in networking and telecommunications.

To further develop CIDR's instructional videotapes on computer-related technology and instruction, CIDR employed part-time an Instructional Video Developer. In addition to videotaping the many workshop and seminar speakers, he produced instructional videotapes on the use of videodisc technology in teaching and assisted the OLYMPUS grant in designing and producing a videotape illustrating some of their projects.

Other temporary and part-time staff have included a Teaching Assistant who (1) worked with the coordinator in developing and teaching workshops which use our microcomputer laboratory in Parrington and (2) assisted faculty in identifying research relevant to their proposed projects. We have also received assistance from students completing internships and research associates funded by external grants. Additionally, CIDR has contributed a portion of CIDR's co-directors' time as well as clerical and staff support.

Since 1983, then, CIDR has procured funding, facilities, and staff resources in an effort to assist faculty in the application of computer-related technology for instructional purposes. In the next section we describe the projects we have undertaken to respond to the diverse faculty requests.

Project Descriptions

The following section briefly describes projects undertaken by CIDR staff to respond to the *four* categories of faculty requests described above. CIDR's 1985-1986 Annual Report and the publications listed in Appendix B describe in further detail many of these projects.

Faculty Instructional Development

Faculty have frequently requested information from CIDR on the use of computer-based technology in instruction. This often involves a consultation with a specific instructor, but can also result in workshops or seminars. Requests for support in altering course content, in modifying methods of instruction and in evaluating the effects of different instructional approaches are common. Instruction with computer-based technologies usually requires that instructors re-evaluate what they are teaching and how they provide instruction for their students. Projects have included one day workshops, multi-day seminars, and the development of video tapes illustrating instructional uses of computer technology.

Workshops and Seminars

CIDR, in collaboration with the Office of Instructional Computing in the College of Arts and Sciences, coordinated a series of one-day workshops for faculty on "CAI Design" by Robert Dixon (University of Illinois), "Current Approaches to CAI" and "Tencore-A PC Plato language" by Fred Hofstetter (University of Maryland), and "Teacher's Aide, A CAI Authoring System" by Robert Cullen (Selective Systems). CIDR also provided facilities for lectures to interested faculty by Potluri Rao on "Using UWCOM in Instruction" and Rodney Stark on "Using Computers in Teaching a Large Lecture Sociology Class."

CIDR has assisted in presenting three workshops on the use of videodiscs in teaching. First, while supported by CIDR, Eric Halsey (Office of Minority Affairs, University of Washington) presented a workshop to faculty on "AVID: An Interactive Videodisc Authoring Language." In collaboration with the Office of Instructional Computing and the University of Washington Special Interest Group on Videodisc, a full day presentation on "Laserdisc Technology in Instruction" was presented to UW faculty. In collaboration with the International Interactive Communication Society, CIDR presented a 3 hour workshop for faculty on recent developments in using interactive laserdisc technology in teaching.

CIDR's CAI Coordinator Lynn Churchill has presented to UW faculty several workshops on "Using Computer Projection in Lectures," "Using Databases in Instruction," and Using Spreadsheets in Instruction." Issues addressed in these workshops include modifying one's teaching approach, designing effective computer displays, developing support materials for students, assessing hardware compatability, and designing approaches to testing students' learning.

In response to extensive faculty interest in the instructional uses of expert systems, CIDR staff developed and presented a 40-hour seminar series where faculty learned how to use expert systems and developed a prototype in their own content domain. In collaboration with the AI research group on campus, Texas Instruments, and Boeing Computer Services, CIDR coordinated two satellite teleconferences on artifical intelligence.

Instructional Videotape Development

Requests to explain the role of computers in technology to various audiences has led CIDR to support three types of videotape development. First, in response to many requests from faculty about the potential role of videodisc in education, CIDR staff produced a videotape on the use of interactive videodisc in instruction. One showing of this videotape at the ADCIS conference resulted in 50 requests for further information about purchase.

Second, we have videotaped most of the lectures in our workshops and seminars. Circulation of these videotapes has allowed faculty who were unable to attend the original session to benefit from these programs.

Third, we have assisted other programs in the scripting and design of instructional videotapes about computing and instruction. For example, we assisted the OLYMPUS program by collaborating in the scripting and production of a videotape describing projects supported by the OLYMPUS grant.

Other Faculty Development Projects

With increased use of videotape in instruction, the need to store computer output to videotape has arisen. Specifically, questions related to the conversion of RGB signals from various IBM-compatible graphics boards to NTSC compatible videotape signals have been raised frequently by faculty and staff across campus. In response to departments such as Atmospheric Sciences, Education, Engineering, Mathematics, and Medicine a descriptive report about the problems and potential solutions is currently being completed.

CIDR staff have also undertaken the evaluation of new software to discern its potential for use in instruction on campus. Manufacturers such as IBM and Microsoft have provided CIDR with products, trained our staff, and supported the evaluation of their products for potential implementation in our educational programs. These activities are providing the Center with exposure and experience that will have widespread instructional impact on the campus in years to come. This knowledge has been essential in consulting with departments and faculty interested in future trends related to instructional uses of microcomputers.

For example, CIDR staff evaluated a computer-based instructional approach to the training of faculty to use Microsoft Word as compared to an instructor-based approach teaching the same content. Effectiveness of the two training approaches was assessed in terms of the amount of time that it required participants to complete three typing and editing exercises and the amount of difficulty encountered in accomplishing each task. Aspects of the participant's attitudes toward the exercises were also assessed. Multiple forms of self-report and instructor observation were used.

In addition to the evaluations described above, CIDR staff and an interdisciplinary group of faculty from the Mathematics Department, the Educational Assessment Center, and Office of Minority Affairs evaluated several currently available Computer Managed Instructional Systems. In a CMI system a student's learning problems are diagnosed, an instructional activity (which can be non-computer based) is recommended, and thorough records of the interaction between the student and computer are maintained.

Individual Project Consultations

Faculty often come to CIDR and request the use of the instructional laboratory for innovative uses of microcomputers in their discipline or to request consultation or instructional support for a specific project. CIDR staff have provided instructional design, curriculum design, systems design, video production, and evaluation support for a number of such projects. In such projects, CIDR's laboratory is used as a facility where innovative uses of computer-based technologies can be piloted and evaluated. CIDR staff have assisted faculty in the following departments:

Architecture and Urban Planning-Architecture

Arts and Sciences-Anthropology; Art History; Atmospheric Sciences; Chemistry; Computer Science; Drama; English; Geography; Mathematics; Music; Psychology; Sociology; Speech Communication; Office of Instructional Computing

Business Administration-Computer Services Office; Quantitative Methods

Education-Curriculum and Instruction; Educational Psychology; Special Education

Engineering-Civil Engineering; Electrical Engineering; Technical Writing

Graduate School of Public Affairs

Health Sciences-Animal Medicine; Neuropathology; Nuclear Medicine; Nursing; Physiology; Psychiatry; Radiology; Rehabilitation Medicine

Library and Information Science

Pharmacy-Pharmaceutics

Social Work

Many of these projects require extensive consultation. Following are brief descriptions of such projects.

<u>An Experiment Evaluating Usage and Writing Achievement of Student Using WANDAH</u>

As part of the collaborative research program of CIDR co-director Robert Abbott and Professor Anne Gere in English, this project (1) described student's patterns of usage of the writing tools in WANDAH, an integrated software package of prewriting, word processing, and revising programs; and 2) compared the subsequent writing of students who used WANDAH programs in their composing process with the writing of matched control students who did not use the computer tools during a composition course. The data collection and preliminary analysis occurred in 1984-1985. The final report of this evaluation will be written during the 1986-1987 academic year.

<u>Computer Assisted Rehabilitation of Cognitive Deficits in Brain-Injured Students</u>

In collaboration with Professor Marvin Brooke in Rehabilitative Medicine, brain injured students are being evaluated and trained to respond to educational material presented on a computer monitor using a light pen or mouse despite significant cognitive and motor deficits. Objective, quantifiable data is recorded including reaction time, motor accuracy, and cognitive function. Performance has been compared to a control group without brain

injury. Preliminary results suggest that brain injured students are able to learn the material and improve their performance.

Development of Discovery Algebra Computer Assisted Instruction

In this project, supported by a grant from the IBM Corporation, in collaboration with the Department of Mathematics and Office of Minority Affairs, CIDR staff developed eight interactive computer assisted instruction lessons which teach a range of exponentiation skills from basic definitions to simplifying complicated rational expressions. Each topic involves the students in a Socratic dialogue, then elicits the statement of paradigm or algorithm, and finally provides practice in related skills. A comparative evaluation supported the use of the computer software in future instruction.

Preservice Mathematics Teacher Training

CIDR staff assisted Professor Jack Beal in the College of Education in exploring the use of IBM PCs to enhance the instruction of preservice teachers who will teach mathematics at the secondary level. Student teachers worked with CAI software and the programming language LOGO to explore the potential for the use of computers in the instruction of mathematics.

Librarian Training in Instructional Uses of Computers

In this project, CIDR staff assisted Professor Ed Mignon of the School of Librarianship in designing teaching, and evaluating a course discussing instructional uses of large databases, videotext, CD ROM technology, and electronic mail.

Native American Language Transcription

In collaboration with the Arts and Sciences Humanities and Arts Computer Center (HACC), CIDR staff assisted Professor Betty Edwards of Anthropology in the instructional design of a course that teaches students how to transcribe from one Native American Language to another. HACC developed a variation of a word processing program which would print the characters used in the Native American languages and CIDR assisted in the design for the computer-based curriculum and learning activities in the course.

Computer Applications to Pharmacometrics

In this project, CIDR staff assisted Professor Josh Unadkat of Pharmaceutics in the development of an analysis course that will utilize the computer for the construction of nonlinear regression models in pharmacokinetics and pharmacodynamics.

Educational Uses of Computer Graphics

Developed and taught in collaboration with Professor Jack Driscoll in the College of Education, this workshop explored the potential of computers to generate and display educational graphics. Twenty-five students explored the use of graphics tablets, micro-based computer graphics packages, and larger minicomputer-based graphics systems to become knowledgeable about the tools that educators currently have in the production and communication of graphics. CIDR staff, materials and facilities supported the development and presentation of the 30-hour workshop.

Identifying Multidimensional Learning Outcomes of Instructional Uses of Microcomputers

Many teachers follow Bloom's taxonomies of cognitive and affective objectives in identifying the intended learning outcomes of their instruction. Often, projects incorporating the uses of microcomputers into the instruction of university students are not amenable to analysis using these taxonomies. In this project, in collaboration with Professor Anne Gere in the Department of English, CIDR staff developed an approach to identifying learning outcomes of instructional uses of computers which is an extension of Gagne and Messick. This approach identifies learning outcomes as directed toward Verbal Knowledge, Intellectual Skills, Cognitive Strategies, Motor Skills, and Noncognitive outcomes. Furthermore, efforts to identify intended learning outcomes take place in a larger instructional context within which we discuss five concerns prevalent in the instructional psychology literature: 1) the confounding of content, instructional strategies, and computer effects in studies of instructional uses of microcomputers; 2) novelty effects of instructional uses of microcomputers; 3) the need to test for transfer and retention; 4) the potential for trait x treatment interactions; and 5) the need to assess the fidelity of instructional implementation. In the second part of this project, we investigated the usefulness of this approach in the identification of learning outcomes in a project evaluating software tools in the instruction of writing.

Simulation of Energy Consumption in Building Design

In this project, CIDR staff assisted Professor Arnold Rosner in the College of Architecture and Urban Planning in the development and evaluation of software which simulates the impact of various aspects of building design on energy consumption over the life expectancy of a building.

Use of Networking and Telecommunications

Faculty have found that computers can be effectively used to access information for instruction and to deliver instruction via telecommunications. The desire to access such information has led faculty to inquire about the use of databases for instructional purposes. The use of a small extract of a larger database to illustrate a particular concept is only one of the many creative applications that instructors are requesting. Other issues include the use of satellite or optical fiber communications to deliver instruction from or to distant sites. This technology can provide access to expertise that has been too expensive to obtain in the past. A recent satellite teleconference on campus, for example, linked four panels of internationally known journalists in Austria, England, Japan, and the United States to over 200 universities around the world. Following discussion by the panelists on various topics, students at the remote sights were able to question the panelists on various issues.

In addition to providing coordinating support for the satellite teleconferences mentioned earlier, CIDR staff have undertaken the following projects:

Instructional Configuration of an IBM Local Area Network

To an increasing degree, campus facilities are incorporating the use of local area networks to facilitate both instruction and the administration of courses. The recent release of the IBM local area PC-network resulted in the need to configure that network for instructional applications. CIDR staff have completed considerable benchmark testing and exploration to identify the critical parameters of the network that affect performance. As a result of this study, modification of the default values of the network parameters resulted in a five-fold decrease in the time necessary for a student to boot into the network. In addition, the standard hardware and software design of the network from IBM has been extended to support an instructional environment which is virtually "transparent" to the user.

IBM thought that the resulting report was an outstanding contribution to the instructional uses of PC-Networks and published and distributed the technical report as a monograph. A book-length manuscript discussing the configuration and use of networks for instruction is currently being completed under contract to Microsoft Press.

Training Hearing-Impaired Students to use Kermit and Mail

Hearing impaired students have been denied unassisted use of microcomputers due to the use of "audible" tones within programs. This has included the use of computer-based mail systems with the potential to enhance these students' communication with peers and instructors. At the request of faculty in Special Education, this project investigated the magnitude of this problem and potential solutions for computer systems at the University of Washington. Results of this project are influencing user interface designs and the training of non-hearing impaired students and faculty as well.

Using Advanced Educational Workstations

With rapid changes in computing and technology comes the need to stay abreast of new and possibly better means by which to deliver instruction. CIDR staff currently work closely with industry to stay abreast of new advancements in both software and hardware. Faculty have found CIDR to be a resource for securing information and consulting related to advanced educational technologies such as voice compression and storage, interactive videodisc and intelligent computer applications using expert systems. Projects in collaboration with UW faculty include:

Demonstration Videodisc of Teaching Pre-calculus Mathematics in Biology

In collaboration with the Educational Assessment Center, the Department of Mathematics, and the Office of Minority Affairs, CIDR staff developed a videodisc demonstrating the teaching of pre-calculus mathematics in biology. The demonstration videodisc was based on an earlier videodisc developed by Dr. Eric Halsey and the Educational Assessment Center.

Intelligent Videodisc Project.

The purpose of this project is to develop an integrated system linking an expert system, a relational database, a statistical package, and a videodisc player. A prototype system is currently running on an IBM PC for an application in Neuropathology. An interdisciplinary team of UW faculty and CIDR staff is working on a generic programming environment that will allow transferability of the approach to other content domains such as art history, forestry, and geography.

Development of a Videodisc Lecture Utility

A side effect of the numerous videodisc-related projects at CIDR is the construction of a very flexible videodisc control program that will facilitate the use of generic videodiscs in lecture teaching. In this project, CIDR staff are extending the videodisc control program to allow the lecturer to select either single frames or motion sequences from a videodisc and place them into a "Slide Presentation" utility. With the increase in the number of generic videodisc across many disciplines, this utility can be used to enhance lectures and the use of slide libraries on campus.

Development of a Videodisc of Northwest Native American Art

In conjunction with the Burke Museum, Indian Studies, and Department of Art, CIDR assisted in the writing of grant proposals to develop an archival videodisc to store Dr. Bill Holm's (Affiliate Professor, Art History) world renown collection of 30,000 slides of Native American art. We are also developing an example of an interactive instructional course on a particular aspect of this topic.

Development of a Videodisc in Juvenile Delinquency

CIDR provided assistance to Professor Hy Resnick in the School of Social Work by developing a videotape illustrating the educational benefits of videodisc applications to role playing games in the area of juvenile delinquency. The videotape was used to educate students and faculty on the potential of videodisc technology and to assist in securing additional funding to produce the videodisc and do research on its effectiveness.

Videodisc Applications in Diagnostic Radiology

Every year during the months of July and August, faculty members of the Department of Radiology present a tutorial for entering residents. The purpose is to introduce these new residents to the field of Radiology, and to prepare them for their responsibilities in providing consultative service during the evenings and week-ends. This course is regarded as extremely important, given that the residents will in some instances take "general" call, without having actually rotated on important services. A CAI system is expected to provide a useful adjunct to the established lectures by being available at any time to residents and by encouraging self testing. Since Radiology is a visually oriented specialty, the presentation and self-testing aspects needed in the application would work best with a videodisc display system. CIDR staff are assisting the department in securing funding to develop the necessary videodisc and instructional materials.

Appendix B: Publications and Presentations

Abbott, Robert and Gere, Anne "Identifying learning outcomes of instructional uses of microcomputers: A multidimensional approach and application to the teaching of written composition." (pp. 301-306) In John C. Daily and Fred D. Dwyer (Eds.) Proceedings of the 1985 IBM Academic Information Systems University AEP Conference. Milford, Connecticut: IBM Academic Information Systems, 1986.

Betza, Ruth. "Evaluating Writing Software." Presented at the 3rd Annual Conference of Computers in Writing, University of Pittsburgh, May, 1986.

Betza, Ruth. Instructional Use of Computers at the University of Washington. University of Washington: Center for Instructional Development and Research and Office of the Vice Provost of Computing, 1986.

Brooke, Marvin and DeKroes-Brooke, L. "Effectiveness of computer assisted cognitive rehabilitation of visual perception." Archives of Physical Medicine and Rehabilitation, 1985, 66, 526-527.

Churchill, Lynn. "Instructional Program Evaluation" Presented at OLYMPUS Cluster meeting, Seattle, Washington, 1984.

Churchill, Lynn. "Networking and Telecommmunication in Instruction" Presented at Washington Association of School Business Officials, Seattle, Washington, 1984.

Churchill, Lynn. "Computer Literacy Programs for Teachers" Presented at CompuFair'84, Tacoma, Washington, 1984.

Churchill, Lynn. "Use of Computers for Instruction in Higher Education" Presented at High School and College Conference, Seattle, Washington, 1985.

Churchill, Lynn. "Workshop on Trends of Hardware and Software in Education" Presented at National Teleconference on Software Selection and Evaluation, Seattle, Washington, 1985.

Churchill, Lynn. "Current Trends of Technology in Education" Presented at Prescription Learning Conference, Seattle, Washington ,1985.

Churchill, Lynn. "Model Instructional Laboratory is Underway" OLYMPUS Newsletter, Issue No. 4, May, 1985.

Churchill, Lynn. "Current Trends of Computing in Science Education" Presented at WAMI Medical Education Conference, Rosario, Washington, 1985.

Churchill, Lynn. "Instructional design issues and the effective use of graphics in computer-assisted instruction" Computers in Life Science Education, Vol. 2, No. 6, June, 1985.

Churchill, Lynn. "Improving Faculty Productivity" Presented at University of Washington OLYMPUS Open House, November, 1985.

Churchill, Lynn. "CIDR Actively Involved with Faculty Training in Interactive Videodisc and Expert Systems" OLYMPUS Newsletter, Issue No. 11, March, 1986.

Churchill, Lynn. "Training the Hearing Impaired to Use Kermit and Mail" OLYMPUS Newsletter, Issue No. 11, March, 1986.

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Churchill, Lynn. "Use of Interactive Videodisc in Lecture and Tutorials" Presented at 1986 AEP Conference, San Diego, Ca., June, 1986.

Churchill, Lynn. Instructional Uses of Microcomputers: Overview of Current Projects, Spring, 1986 University of Washington: Center for Instructional Development and Research, 1986.

Churchill, Lynn; Graham, Steve; Halsey, Eric; and Model, Harold. "Use of the Computer in Lecture Settings" Presented at the ADCIS Conference, New Orleans, La., February, 1986.

Churchill, Lynn; Halsey, Eric; and Siler, Randy. "First Quarter Report on Interactive Videodisc Project" University of Washington: Center for Instructional Development and Research, 1985.

Churchill, Lynn; Halsey, Eric; and Siler, Randy. "Second Quarter Report on Interactive Videodisc Project" University of Washington: Center for Instructional Development and Research, 1986.

Churchill, Lynn; Halsey, Eric; and Siler, Randy. "Third Quarter Report on Interactive Videodisc Project" University of Washington: Center for Instructional Development and Research, 1986.

Churchill, Lynn; Johnson, Heidi; Douthit, Pam; Imori, Chris. "A Study of the Applicability of Interactive Videodisc to Higher Education" University of Washington: Center for Instructional Development and Research, 1986.

Gere, Anne Ruggles. "WANDAH: A Study of WANDAH's Effect in Composition Classes" Presented at the 2nd Annual Conference on Computers in Writing, May, 1985, University of California, Los Angeles.

Halsey, Eric. "Discovery Algebra Computer Assisted Instruction" Presented at the ADCIS Conference, New Orleans, La., February, 1985.

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Halsey, Eric. Discovery Algebra CAI Course Software University of Washington: Health Sciences Center for Educational Resources, 1986.

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Siler, Randy. "The IBM PC Network in an Instructional Setting" Presented at AEP Conference, San Diego, California, April, 1986.

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